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EXPERIMENT STATION WHEAT AND OATS IN 1889.

R. P. SPEER.

Wheat was a profitable crop in Iowa until about 1870, and averaged from 20 to 30 bushels per acre. Since then, on account of deterioration of soils, changes of climate, rust, blight and chinch bugs, the acreage and average yield have grown less steadily. Last year the average yield of wheat in the state was nine bushels per acre, and in 1881 it ran as low as six bushels. At the present time we are depending on Minnesota and Dakota for a large share of our bread, but the constant falling off in the yield and quality of the wheat in the states just named indicates, that we will have to go farther for it before long or grow it ourselves. One of our tasks at the Iowa Experiment Station will be, to produce hardier and more productive kinds of wheat than those which we have now, and determine the best methods of preparing the ground for them. Last year we sowed twelve kinds of wheat broad-cast, at the rate of 75lbs per acre on undrained ground which received only ordinary preparation; but all of them proved worthless on account of rust and blight. Last summer, we broke up an old pasture to the depth of four inches after tile draining it. Last March, 2.30 acres of this plat were thoroughly pulverized with a disc and reversible harrow and sowed broad-cast at the rate of 70lbs per acre with the following kinds of wheat, viz: Black Sea, Fife, White Fife, Manitoba Fife, Golden Globe and Lost Nation. The ground was then thoroughly harrowed and rolled. Immediately afterwards, I applied top-dressings of Peruvian guano, land plaster and common salt to strips running across the different kinds of wheat, leaving other strips between them not fertilized. All of the varieties grew well and promised a good crop-until most of their blossoms had fallen, when—about one-fifth of the plat, including all of the varieties, was blown down by a rain storm. A few days after the storm, the entire piece of wheat showed much rust and more or less blight. I was unable to discover that any of the different kinds of wheat had been affected by the guano or the land plaster; but I did see clearly, that the best wheat and the cleanest straw was on the strip

to which I had applied salt. As I did not consider any of the varieties sufficiently rust-proof to warrant me in sowing them again, I threshed them together in the field on July 30th and the yield of the mixture per acre, proved to be 19 bushels of more or less shriveled wheat. On the south end of the Station grounds is a plat of $1\frac{1}{4}$ acres, three-fifths of which is old ground and the remainder was a low, wet slough, which was thoroughly drained and broken in June, 1888. Last fall this plat was plowed to the depth of eight inches, and last March it was well pulverized with a disc and reversible harrow, when it was sowed, (broad-cast) with one bushel of Velvet Chaff Blue Stem wheat and then harrowed and rolled thoroughly. It came up well, stood well and made a large growth; but on the lowest ground about one-fifth of the wheat was blown down when it was in blossom and remained down. A few days afterwards, I noticed that the blades of the blue-stem wheat were slightly rusted, but at no time did any appear on its stalks. On July 30th, the wheat on this plat was threshed in the field and yielded $48\frac{2}{3}$ bushels by weight of plump wheat, or 28.62 bushels per acre. I also sowed $3\frac{1}{2}$ pecks of Saskatchewan wheat broad-cast on 1.55 acres adjoining the blue stem plat, on the same day that the latter was sown. It was old ground which had never produced wheat and it was plowed deeply last fall. In other respects it was treated like the blue stem plat. The Saskatchewan wheat stood well; it stood up well, and was affected but little by rust or blight. It was threshed in the field at the time the other varieties were threshed and yielded $46\frac{1}{2}$ bushels by weight of full, plump wheat, or at the rate of 29.80 bushels per acre.

OATS.

Last spring I procured from different sources from half of a bushel to four bushels of each of fifteen named varieties of oats, which were sowed broad-cast at the rate of $2\frac{1}{3}$ bushels per acre, (March 24th), on good ground that was tile-drained last summer and plowed eight inches deep last October. The preparation of the ground before and after sowing, was the same as that which was given to our wheat ground. The names of the fifteen varieties were as follows, viz: 1st, Burpee's New Welcome, 2d Badger Queen, 3d Improved American, 4th White Australian, 5th Race Horse, 6th White Bonanza, 7th Henderson's Clydesdale, 8th White Victoria, 9th Wide Awake, 10th Prize Cluster, 11th Everett, 12th American Banner, 13th Hargett's White Seizure, 14th Red

Rust-Proof, and 15th Dakota Gray. The blades of all of the varieties named above, were rusted only slightly, except the Dakota Gray and Red Rust Proof oats, which I have discarded, because they did not show sufficient vitality. All of the varieties stood up well until they were harvested. The first eight varieties named were tall oats and numbers 9, 10, 11, 12, and 13 were of medium height. As all parts of the different plats of oats appeared to be alike in all respects, a strip of one rod in width by four rods in length was measured carefully from the northeast corner of each plat or variety and cut with a grain cradle and afterwards threshed separately for the purpose of determining the yield per acre of each variety. On July 29th, when our oats were threshed in the field, it was found that the yield of the different varieties per acre, (counting 32lbs for a bushel), was as follows, to-wit. No. 1—52 bushels, No. 2—52½ bushels, No. 3—46¼ bushels, No. 4—46½ bushels, No. 5—52½ bushels, No. 6—65 bushels, No. 7—48¾ bushels, No. 8—52½ bushels, No. 9—48⅓ bushels, No. 10—69 bushels, No. 11—66 bushels, No. 12—64⅓ bushels.

Limited quantities of each of the varieties of wheat and oats which I have named, were planted last March in rows about 3½ feet apart on good well prepared ground in our new experimental orchard. The cultivator was used twice between the rows early in the season and afterwards they were kept clean with a hoe. The different kinds of wheat and oats started and stood well, but they rusted and blighted much worse than where they were sown broad cast. They were a week longer in ripening and their average height was not more than three quarters of that of the latter. After our wheat and oats began to ripen, I spent four days in selecting the best stalks of the most promising varieties for seed. While doing so, I noticed that the stalks which grew on the outsides or edges of the different plats were largest and much later and more rusted than inside stalks. I also found that the grains of wheat and oats produced by such stalks, were more or less shriveled when ripe. The best heads were found within the borders of the different plats and generally on stalks which stood from eight to ten inches from others.

CONCLUSIONS.

The principal cause of our failures in growing wheat and oats is rust. For a considerable number of years after our prairies were broken, it gave us but little trouble; but the

mechanical conditions of the soil are very different now from what they were then. During the early days of the state, our soils were full of decaying wild grass roots which caused them to be comparatively cool, porous and moist during the growing seasons. But the old grass roots are gone and the numerous root spaces which admitted atmospheric air with its moisture freely, are closed up.

In dry weather the ground in our wheat fields becomes hard and hot, and when the wet sultry days do come, they furnish the best conditions for rust and other fungous diseases. More clover should be grown, not only for the purpose of bringing up soluble plant food from the sub-soil, but that it may be turned under by the plow to render the soil porous. Tile drainage is also needed, to let surplus water pass off rapidly and prevent baking of the soil. I would sow salt with wheat and oats, not as a fertilizer; but because it attracts moisture in dry weather.

The planting of wheat or oats in rows or hills at a considerable distance from each other, is like planting lone trees on the open prairies, where they invariably grow low and scrubby. Like trees, stalks of wheat and oats have inherited the characteristic of requiring protection from each other; but they will not bear crowding, or prove healthy and productive' when scattered to widely apart. Nothing has damaged the wheat fields of the West more than chinch bugs, except rust. Last year, they appeared in our fields in great numbers, but they were attacked and so nearly exterminated by a fungous disease before cold weather, that they have given us no trouble this season. If the fungous parasites should not follow up the chinch bugs in the future, I am confident that we can prevent them from destroying our wheat crops without much trouble. In 1887 and 8, we found that they preferred Hungarian grass to all other kinds of plants on our Station grounds, as they congregated upon it. Last summer, after they had killed all of the plants on the north side of a plat of Hungarian grass and when they were moving steadily across it, I plowed them under as deeply as possible by back-furrowing and harrowed the ground and rolled it three times. By doing so, I saved the uninjured grass on the unplowed part of the plat.

At seeding time, if we should sow a few narrow strips across our wheat fields and around the borders with Hungarian grass, and then plow, harrow and roll the strips at the highth of the chinch bug season, but few of them would survive to injure the wheat.

My observations on the grounds of the Iowa Experiment Station and on my own farm have convinced me, that 30 lbs of Spring wheat per acre, if properly planted on good, well prepared ground at the right time, is too much seed. Generally, oats are sown too thickly also to produce the best results. Wheat and oats stand up better and yield more grain when planted with a drill than when they are sown broadcast.

I have never grown varieties of wheat which had so many desirable characteristics as the Saskatchewan and Golden Chaff Blue Stem; nor have I ever found varieties of oats which I liked better than the Prize Cluster, the Everett and Salzer's White Bonanza.

